UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/017,783	12/13/2001	Abdo Esmail Abdo	IBM / 156	6115

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EXAMINER
ALI, MOHAMMAD

ART UNIT	PAPER NUMBER
2177	3

DATE MAILED: 04/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	**Applicant(s)**
Office Action Summary	10/017,783	ABDO ET AL.
	Examiner	**Art Unit**
	Mohammad Ali	2177

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *13 December 2001*.

2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-24* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-24* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on *13 December 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>2</u>.

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____ .

DETAILED ACTION

1. The application has been examined. Claims 1-24 are pending in this Office

Action.

Information Disclosure Statement

2. The references cited in the IDS, Paper No. 2, have been considered.

Drawings

3. The drawings are objected to because they fail to show necessary textual labels of features or symbols in Fig. 3B as described in the specification. For example, placing a label, "dimensional space", with elements C2C4, C2C3 of Fig. 1, would give the viewer necessary detail to fully understand this element at a glance. A *descriptive* textual label for *each numbered element* in these figures would be needed to fully and better understand these figures without substantial analysis of the detailed specification. Any structural detail that is of sufficient importance to be described should be shown in the drawing. Optionally, applicant may wish to include a table next to the present figure to fulfill this requirement. See 37 CFR 1.83. 37 CFR 1.84(n)(o) is recited below:

"(n) Symbols. Graphical drawing symbols may be used for conventional elements when appropriate. The elements for which such symbols and labeled representations are used must be adequately identified in the specification. Known devices should be illustrated by symbols which have a universally recognized conventional meaning and are generally accepted in the art. Other symbols which are not universally recognized may be used, subject to approval by the Office, if they are not likely to be confused with existing conventional symbols, and if they are readily identifiable.

(o) Legends. Suitable descriptive legends may be used, or may be required by the Examiner, where necessary for understanding of the drawing, subject to approval by the Office.

The drawings are objected to because in Fig. 4 step 1, **CRTERIA(ON)** should be

written as **CRITERIA(ON)**. Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of

the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

the various claims was commonly owned at the time any inventions covered therein

were made absent any evidence to the contrary. Applicant is advised of the obligation

under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g)

prior art under 35 U.S.C. 103(a).

5. Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Chadha et al. ('Chadha' hereinafter), US Patent 5,706,495 in view of Jones et al.

('Jones' hereinafter), US Patent 5,689,698 and further in view of Chadha et al. (Chadha

('46) hereinafter), US Patent 6,032,146.

With respect to claim 1,

Chadha discloses a method for revalidating previously generated statistics for a

query directed to one or more attributes of a relation (see 7, lines 43-50, Fig. 3),

comprising

identifying in said query a selection criterion on said one or more attributes of

said relation (see col. 4, lines 45-46 et seq), and

revalidating a prior statistic generated for a prior different selection criterion on

the same one or more attributes of said relation, based upon a measure of entropy of

said one or more attributes of said relation (see col. 7, lines 11-20, Fig. 2 et seq).

Chadha does not explicitly indicate the claimed revalidating.

Jones discloses the claimed revalidating (request is revalidated, and a query plan

will be formulate. If receiver client access is authorized, the MOL received at the

receiver client is transformed into a second MOL, and transferred to the receiver client,

see col. 15, lines 10-15, Fig. 40, Jones).

It would have been obvious to one ordinary skill in the data processing art at the

time of the present invention to combine the teachings of the cited references, because

the revalidating of Jones teaching would have allowed Chadha's system to optimize

the query plan as suggested by Jones at col. 7, lines 52-57. Revalidating as taught by

Jones improves to access the object in an object server in response to the database

query, see col. 2, lines 33-35, Jones.

Chadha and Jones does not explicitly indicate the claimed entropy.

Chadha ('46) discloses the claimed entropy (rules used for data mining will

appreciate that the association measures can be Chi-square, entropy, see col. 5, lines

14-15).

It would have been obvious to one ordinary skill in the data processing art at the

time of the present invention to combine the teachings of the cited references, because

the revalidating of Jones teachings and entropy of Chadha ('46) teachings would have

allowed Chadha's system to optimize the query plan as suggested by Jones at col. 7,

lines 52-57 and dimension reduction for data mining without the need for a domain

expert as suggested by Chadha ('46) at col. 2, lines 67 to col. 3, lines 1).

As to claim 2,

Chadha teaches wherein said prior statistic is revalidated if a measure of entropy

of said one or more attributes of said relation is less than a predetermined threshold

('input') value (see col. 7, lines 11-18 et seq).

As to claim 3,

Chadha teaches further comprising generating a measure for the entropy of said

one or more attributes of said relation, by the steps of computing frequencies of different

values for the one or more attributes in tuples of the relation (see col. 14, lines 2-15 et

seq), and

combining the measured frequencies into a measure of the entropy of the

attributes (see col. 13, lines 28-35).

As to claim 4,

Chadha teaches wherein generating a measure for the entropy of said one or

more attributes of said relation further comprises collecting a sample of tuples of the

relation, wherein frequencies of different values are computed for tuples in the sample

(see col. 11, lines 37-45 et seq).

As to claim 5,

Chadha teaches wherein combining the measured frequencies comprises

determining a number of distinct values for the one or more attributes, and converting

the computed frequencies to probabilities by dividing the frequencies by number of

distinct values (see col. 11, lines 37-45 and col. 9, lines 55-61 et seq).

As to claim 6,

Chadha teaches wherein combining the measured frequencies further comprises

forming a weighted sum of the computed probabilities (see col. 11, lines 37-45 and col.

9, lines 55-61 et seq).

With respect to claim 7,

Chadha discloses a computer system implementing a relational database system

and evaluating queries directed to said relational database (see 7, lines 43-50 and col.

9, lines 22-30, Fig. 3), comprising

storage for said relational database, including a relation having a plurality of

tuples including values for a plurality of attributes (see col. 4, lines 45-46 et seq), and

computing circuitry performing query optimization and query execution upon said

relational database (see col. 3, lines 27-31), said query optimization including

generating statistics for a query directed to one or more attributes of said relation, by

identifying in said query a selection criterion on said one or more attributes of said

relation (see 7, lines 43-50 and col. 9, lines 22-30, Fig. 3), by revalidating a prior statistic

generated for a prior different selection criterion on the same one or more attributes of

said relation, based upon a measure of entropy of said one or more attributes of said

relation (see col. 7, lines 11-20, Fig. 2 et seq).

Chadha does not explicitly indicate the claimed revalidating.

Jones discloses the claimed revalidating (request is revalidated, and a query plan will be formulate. If receiver client access is authorized, the MOL received at the receiver client is transformed into a second MOL, and transferred to the receiver client, see col. 15, lines 10-15, Fig. 40, Jones).

It would have been obvious to one ordinary skill in the data processing art at the time of the present invention to combine the teachings of the cited references, because the revalidating of Jones teaching would have allowed Chadha's system to optimize the query plan as suggested by Jones at col. 7, lines 52-57. Revalidating as taught by Jones improves to access the object in an object server in response to the database query, see col. 2, lines 33-35, Jones.

Chadha and Jones does not explicitly indicate the claimed entropy.

Chadha ('46) discloses the claimed entropy (rules used for data mining will appreciate that the association measures can be Chi-square, entropy, see col. 5, lines 14-15).

It would have been obvious to one ordinary skill in the data processing art at the time of the present invention to combine the teachings of the cited references, because the revalidating of Jones teachings and entropy of Chadha ('46) teachings would have allowed Chadha's system to optimize the query plan as suggested by Jones at col. 7, lines 52-57 and dimension reduction for data mining without the need for a domain expert as suggested by Chadha ('46) at col. 2, lines 67 to col. 3, lines 1).

With respect to claim 8,

Chadha discloses a program product for implementing a relational database system and evaluating queries directed to said relational database (see 7, lines 43-50, Fig. 3), comprising

a relational database, including a relation having a plurality of tuples including values for a plurality of attributes (see col. 4, lines 45-46 et seq), and

relational database software performing query optimization and query execution upon said relational database (see col. 3, lines 27-31), said query optimization including generating statistics for a query directed to one or more attributes of said relation, by identifying in said query a selection criterion on said one or more attributes of said relation (see col. 5, lines 12-19), by revalidating a prior statistic generated for a prior different selection criterion on the same one or more attributes of said relation (see col. 7, lines 11-20, Fig. 2 et seq), based upon a measure of entropy of said one or more attributes of said relation, and a signal bearing media holding said relational database and relational database software (see 7, lines 43-50 and col. 9, lines 22-30, Fig. 3).

Chadha does not explicitly indicate the claimed revalidating.

Jones discloses the claimed revalidating (request is revalidated, and a query plan will be formulate. If receiver client access is authorized, the MOL received at the receiver client is transformed into a second MOL, and transferred to the receiver client, see col. 15, lines 10-15, Fig. 40, Jones).

It would have been obvious to one ordinary skill in the data processing art at the time of the present invention to combine the teachings of the cited references, because the revalidating of Jones teaching would have allowed Chadha's system to optimize

the query plan as suggested by Jones at col. 7, lines 52-57. Revalidating as taught by Jones improves to access the object in an object server in response to the database query, see col. 2, lines 33-35, Jones.

Chadha and Jones does not explicitly indicate the claimed entropy.

Chadha ('46) discloses the claimed entropy (rules used for data mining will appreciate that the association measures can be Chi-square, entropy, see col. 5, lines 14-15).

It would have been obvious to one ordinary skill in the data processing art at the time of the present invention to combine the teachings of the cited references, because the revalidating of Jones teachings and entropy of Chadha ('46) teachings would have allowed Chadha's system to optimize the query plan as suggested by Jones at col. 7, lines 52-57 and dimension reduction for data mining without the need for a domain expert as suggested by Chadha ('46) at col. 2, lines 67 to col. 3, lines 1).

As to claim 9,

Chadha teaches wherein the signal bearing media comprises transmission media see 1, lines 6-11, Fig. 1).

As to claim 10,

Chadha teaches wherein the signal bearing media comprises recordable media see 1, lines 6-11, Figs. 1, 13).

Claim Rejections - 35 USC § 102

6.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 11-12 and 16-24 are rejected under 35 U.S.C. 102(b) as being

anticipated by Chadha et al. ('Chadha' hereinafter), US Patent 5,706,495.

With respect to claim 11,

Chadha discloses a method for identifying a group of attributes of a relation for

which a multi-dimensional index is to be formed (see 7, lines 43-50 and col. 9, lines 22-

30, Fig. 3), comprising

computing a correlation of attribute values within tuples of the relation (see col. 4,

lines 45-46 et seq), and

forming a multi-dimensional index for a group of attributes within tuples of the

relation having a correlation of attribute values in excess of a threshold (see 7, lines 43-

50 and col. 9, lines 22-30, Fig. 3).

As to claim 12,

Chadha teaches wherein computing a correlation of attribute values within tuples

of the relation comprises collecting a sample of tuples of the relation, and computing

correlation of attribute values within the sampled tuples (see 7, lines 43-50 and col. 9,

lines 22-30, Fig. 3).

As to claim 16,

Chadha teaches wherein combining the measured frequencies comprises

determining a number of distinct values for the one or more attributes, and converting

the computed frequencies to probabilities by dividing the frequencies by number of

distinct values (see col. 7, lines 11-18, col. 11, lines 37-45 et seq).

As to claim 17,

Chadha teaches wherein combining the measured frequencies further comprises

forming a weighted sum of the computed probabilities (see col. 7, lines 11-18 and col. 3,

lines 25-37 et seq).

As to claim 18,

Chadha teaches comprising evaluating attribute groups found to have correlation

to identify primary sources of correlation, by determining a mutual information gain by

comparing information gain for a group of attributes, to the largest information gain of

any sub-group of fewer of the same attributes (see col. 7, lines 11-18, col. 3, lines 25-37

et seq).

As to claim 19,

Chadha teaches wherein a multi-dimensional index is formed for an attribute

group having information gain greater than a threshold, if there is no larger attribute

group including the same attributes having a mutual information gain greater than a

threshold (see col. 7, lines 11-18 et seq).

As to claim 20,

Chadha teaches wherein correlation of attribute values is computed for all

combinations of attributes of a relation, or alternatively by sampling a set of attribute

groups and then evaluating other related groups of those found to have substantial

correlation (see col. 7, lines 11-18 and col. 3, lines 25-37 et seq).

With respect to claim 21,

Chadha discloses a computer system implementing a relational database system including indexes for said relational database (see 7, lines 43-50 and col. 9, lines 22-30, Fig. 3), comprising

storage for said relational database, including a relation having a plurality of tuples including values for a plurality of attributes (see col. 4, lines 45-46 et seq), and

computing circuitry performing query execution upon said relational database, and identifying a group of attributes of a relation for which a multi-dimensional index is to be formed (see 7, lines 43-50 and col. 9, lines 22-30, Fig. 3), by computing a correlation of attribute values within tuples of the relation, and forming a multi-dimensional index for a group of attributes within tuples of the relation having a correlation of attribute values in excess of a threshold (see col. 5, lines 12-19 et seq).

With respect to claim 22,

Chadha discloses a program product for implementing a relational database system (see 7, lines 43-50 and col. 9, lines 22-30, Fig. 3), comprising

a relational database, including a relation having a plurality of tuples including values for a plurality of attributes, relational database software performing query execution upon said relational database (see col. 4, lines 45-46 et seq), and

identifying a group of attributes of a relation for which a multi-dimensional index is to be formed, by computing a correlation of attribute values within tuples of the relation (see 7, lines 43-50 and col. 9, lines 22-30, Fig. 3), and forming a multi-dimensional index for a group of attributes within tuples of the relation having a

correlation of attribute values in excess of a threshold (see col. 5, lines 12-19 et seq),

and

a signal bearing media holding said relational database and relational database

software (see col. 3, lines 27-35).

As to claim 23,

Chadha teaches wherein the signal bearing media comprises transmission media

(see 1, lines 6-11, Figs. 1, 13).

As to claim 24,

Chadha teaches wherein the signal bearing media comprises recordable media

(see 1, lines 6-11, Fig. 1).

8. Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Chadha et al. ('Chadha' hereinafter), US Patent 5,706,495 as applied to claims 11-12,

16-20 above in view of Chadha et al. (Chadha ('46) hereinafter), US Patent 6,032,146.

As to claim 13,

Chadha teaches wherein a correlation of attribute values is computed as an

information gain for those attributes by comparing, for a common set of tuples, a sum of

individual entropies of values of each attribute, to a joint entropy of the values of all

attributes (see col. 5, lines 12-19 et seq).

Chadha and Jones does not explicitly indicate the claimed entropy.

Chadha ('46) discloses the claimed entropy (rules used for data mining will

appreciate that the association measures can be Chi-square, entropy, see col. 5, lines

14-15).

It would have been obvious to one ordinary skill in the data processing art at the

time of the present invention to combine the teachings of the cited references, because

the entropy of Chadha ('46) teachings would have allowed Chadha's system for

dimension reduction for data mining without the need for a domain expert as suggested

by Chadha ('46) at col. 2, lines 67 to col. 3, lines 1).

As to claim 14,

Chadha teaches wherein a measure for the entropy of one or more attributes is

generated by computing frequencies of different values for the one or more attributes in

tuples of the relation, and combining the measured frequencies into a measure of the

entropy of the one or more attributes (see col. 11, lines 37-45 et seq).

As to claim 15,

Chadha teaches wherein generating a measure for the entropy of said one or

more attributes of said relation further comprises collecting a sample of tuples of the

relation, wherein frequencies of different values are computed for tuples in the sample

(see col. 7, lines 11-18, col. 11, lines 37-45 et seq).

Contact Information

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mohammad Ali whose telephone number is (703) 605-4356. The examiner can normally be reached on Monday to Thursday from 7:30am-6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Breene can be reached on (703) 305-9790 or Customer Service (703) 306-5631. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306 for any communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-9600.

Mohammad Ali

Patent Examiner

AU 2177

MA

April 07, 2004